Resistance

A most important cause of power loss in TL, Unless specified it means **effective resistance** of conductor which is

$$R = \frac{Power\ loss}{I^2}\Omega$$

Where,

I- R.M.S. current in conductor in $Amps$.

P - Power in watts

Spiraling of conductors increases the conductor's length which in turn increases the **Resistance** by $1\ to\ 2\%$ for concentrically stranded conductors.

Capacitance

The capacitance existing between 2 conductors is defined as **charge on the conductors per unit potential difference between them.**

Inductance

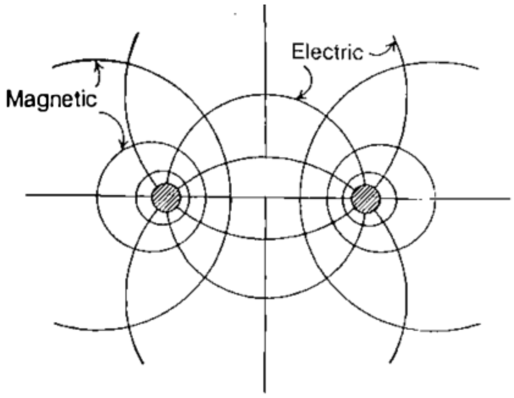

FIGURE 4.1
Magnetic and electric fields associated with a two-wire line.

> Variation of the current in the conductors causes a change in the number of lines of magnetic flux linking the circuit. Any change in the flux linking a circuit induces a voltage in the circuit which is proportional to the rate of change of flux. The inductance of the circuit relates the voltage induced by changing flux to the rate of change of current.

Inductance of transmission line due to internal flux,

If permeability μ is constant, Sinusoidally varying current produces Sinusoidally varying flux in phase with current,

Flux linkage can be expressed as phasor λ measured in weber turns and instantaneous **current** i is substituted for Phasor **I**, Then λ is instantaneous flux linkage produced by current **I**.

$$L = \frac{\lambda}{I}$$

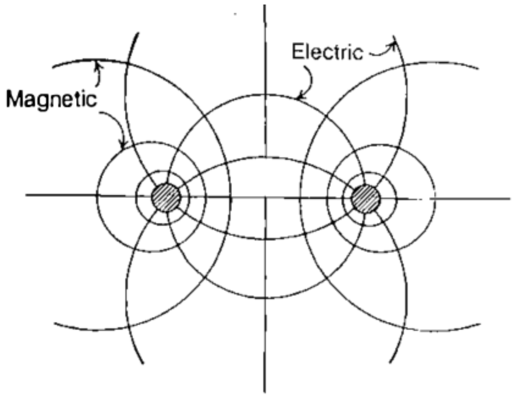

FIGURE 4.1
Magnetic and electric fields associated with a two-wire line.

In the above image only flux lines external flux are shown, But Some of the magnetic flux exist inside the conductors, The changing lines of flux inside the conductor also contribute to induced voltage of the circuit and therefore to inductance.